MARINE REVIEW.

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More than Three Millions of Ore—Lake Freights.

Official figures covering the ore movement from all shipping ports were received again on the first of the month by the Cleveland Ore Shippers Association. Shipments by ports are not given out but the aggregate figures are as follows:

	1895, Gross tons.	1894, Gross tons.
Shipments from all ports, opening of navigation to June 1.....	1,447,329	1,208,469
Shipments from all ports during June	1,695,428	1,296,943
Total to July 1.....	3,142,757	2,505,412

Increase thus far in 1895, 637,345 gross tons.

This movement of more than 3,000,000 gross tons of ore in two months is of course very heavy, but it is hardly more than was expected, as some of the shippers had figured on full 2,000,000 tons during the month just passed. Heavy shipments to South Chicago are an important factor in this aggregate. It is evident that the ore dealers are sparing no effort in their desire to move the great bulk of the mining product early and avoid any possibility of being caught by high freights later in the season, in event of improvement in grain shipments. Docks at Lake Erie ports are now and have been crowded to their utmost capacity and it is not possible to continue shipments at the present rate for any great length of time to come, but vessel owners are depending upon grain shipments towards the close of the present month and their confidence in the freight market is not shaken on that account. Although all efforts to advance ore freights have met with the strongest kind of opposition, shippers seem satisfied to move as much ore as possible without change in the present rates. In a few cases bids have been solicited during the past week on blocks of 40,000 to 50,000 tons of ore, to be moved during the balance of the season from the head of Lake Superior, but there was no report of any business of this kind having been closed up, as vessel owners were of the opinion that $1 a ton should be paid on any such contracts and shippers say that the situation is not strong enough as yet to admit of that figure being paid.

Confidence in freights for the future, even with a reduction in ore shipments, is maintained more from expectations of grain moving next month than from any hope of high coal freights. All reports regarding the spring wheat crop of the northwest are of a very encouraging nature, and Duluth grain freights are always more helpful to the lake trade during the latter part of the season. A big corn crop is also expected but corn is, of course, late in moving. During the past few days 75,000 to 100,000 tons more of soft coal, to go to the head of Lake Superior, has been covered by contract at 35 cents, so that deals of this kind now involve probably 600,000 or 700,000 tons of coal. These transactions act against improvement in coal freights, and from the present outlook there is little hope of the coal business being helpful to the general market, except to the extent of its delaying vessels and restricting ore shipments. Ore freights are steady at this writing at 85 cents from Two Harbors, Ashland and Duluth, 75 cents from Marquette and 55 cents from Escanaba.

Delay to Ore Carriers at Duluth.

Masters of vessels carrying ore from Duluth have complained of delay in obtaining clearance papers, on account of the docks of the Duluth, Mesabi & Northern Railway being located about three miles from the office of the collector of customs. A great quantity of ore is being shipped over these docks this season. The docks have all of the advantages of modern construction, and vessels are frequently loaded and ready to depart in two hours after their arrival in port, so that they are often delayed by more time being required in obtaining a clearance than is necessary to load them. Then, too, captains trading to Lake Superior are careful about the loading and trimming of their boats, as they are desirous of taking full advantage of the Sault canal draft, and can not well leave their vessels while loading to secure clearance papers. They have accordingly applied to the officers of the Lake Carriers' Association to secure, if possible, the appointment of a deputy collector at the ore dock, and Secretary Keep has taken the matter up with the collector at Duluth, who has submitted it to the department and promises to do all in his power to remedy the difficulty. Now that ore shipments have resumed from the dock on Allouez bay, Superior, this same difficulty will be encountered, so that any remedy provided for the Duluth dock should apply also to the dock in Superior.

How the Cayuga was Found.

The successful ending of the expedition to find the wreck of the Lehigh Valley steamship Cayuga, which was headed by Capt. C. H. Sinclair, makes the search noteworthy among all the expeditions which have been at work this spring looking for sunken vessels. Capt. Sinclair, wrecking master for C. A. Macdonald & Co., the Chicago underwriters who were requested by the foreign companies having risks on the Cayuga to take charge of the work, arrived in Cheboygan, June 28. The following Sunday he went out on the tug George W. Cuyler to set buoys on the spot marked by ranges. Capt. Sinclair had for his guide the bearings and the sounding of 17 fathoms, which Capt. Martin Swain took when he picked up the steamer Joseph L. Hurd, after her collision with the Cayuga. It was certain the Hurd had not moved at all, for her anchor chains had gone overboard when her bow was crushed in, and securely anchored the wreck. Capt. Sinclair had ranges taken also from the Hurd, and buoyed the place. Then he went to the keeper of the Skillagalee light and obtained ranges from him, which corresponded exactly with the ones taken by Capt. Swain. But the distance given by the light-house keeper was farther than the wreck was situated. Capt. Swain had taken careful soundings when he was at the Hurd, and had given Capt. Sinclair a depth of 17 fathoms. Finding that Capt. Swain's ranges were verified by the light-house keeper, Capt. Sinclair began searching for a spot on these ranges with 17 fathoms. Immediately the lead line gave 101 feet, one foot less than 17 fathoms. He set a buoy, and considerable time being left in the afternoon, the Cuyler started dragging with her anchor. She had been going but a few minutes when the anchor struck something. By the feeling of the line, the anchor was sliding over a steel hull, having struck the bottom first. Supposing the spars were pointing to the south and the Cayuga was on her side, Capt. Sinclair had the dragging started from that direction, and presently the anchor fastened in the wreck. It was supposed that it was fast in the rigging, for it would not come up and in pulling the line parted. Putting a buoy on the spot, the Cuyler went back to Cheboygan and got the tug Dana. The next day, which was Monday, the two tugs dragged over the wreck, and brought up the flag staff from the stern rail and the boom from the fourth mast. Some other portions of the wreck were also brought to the surface, among them being a portion of the bulwarks where the anchors had fouled, and a piece of the wire rigging.

"The credit for finding the wreck," Capt. Sinclair said, "is due to Capt. Martin Swain, of the Favorite, for it was from his soundings and ranges that we were able to locate the Cayuga. Of course one person can not give bearings exactly to another, but I found his ranges were not 20 rods away from the wreck. Capt. Wilson of the Hurd also took soundings, which served to verify Capt. Swain's. We were extremely fortunate in finding the boat in so short a time. She lies a half mile eastward of the regular course of steamers, but nearly on the course taken by the Lake Superior line boats. The soundings on the wreck showed the beam of the sunken boat to be the same as the Cayuga. There is 101 feet by the wreck, and 60 feet over it. The Cayuga is 41 feet wide, which just makes the difference."

From the first, Capt. Sinclair had been of the opinion that the Cayuga when she went down rolled over on her side, on account of the air in the water bottom compartments, which, of course, were empty. The other expedition, which was sent out under the direction of Underwriter Prentice of New York, went on the theory that the steamer went straight down and was resting on her bottom with her spars sticking straight up or nearly so. When they dragged for several weeks in the vicinity, they were expecting the drag to catch in the spars, and consequently missed the steamer. Before Capt. Sinclair had set out from Chicago Mr. Macdonald bet him $50 against a good cigar that he would not find the wreck in two days. As luck had it the anchor caught in the Cayuga within five minutes after the search had really begun.

Worthington & Sill, Buffalo underwriters, make answer as follows to inquiry regarding the advisability of lake vessels carrying buoys to be used in event of accident: "While we consider a thing of this kind with much favor, our doubts arise as to vessels in general adopting it, particularly in its use to mark newly found obstructions. We should think, however, that it would be practicable for vessels to carry some device that might be available in case of sinking in deep water to mark the locality, and we should be pleased to hear that vessels generally had adopted such a device."

Trying to Discourage Foreign Underwriters.

Somebody connected with one of the Chicago firms that act as general agents for marine insurance companies has been writing to the marine journals of London, England, with a view to discouraging foreign underwriters who have of late been taking most of the risks on steel vessels of the lakes. A late issue of Fairplay of London contains the extracts, which follow, from a Chicago letter:

"There are on the lakes about 110 steel and composite boats, the premium on which at current rates amounts to about $370,000. The losses this season to June 1 aggregate $480,000, leaving the companies doing the business $110,000 less than nothing to face the rest of the season with. Owing to the fact that large steamers on the lakes are very apt to touch the bottom in going through the Sault river from Lake Superior to Lake Huron, or in the narrow channels from Lake Huron to Lake Erie, steel steamers are really worse for underwriters than wooden steamers. Where one of the latter would escape with the 'brooming' of her bottom, and no claim on underwriters, a steel steamer breaks a few frames and plates and costs her underwriters from $15,000 to $20,000 in repairs. Most of the modern steel steamers are built for 20 feet of water, and the above named channels only have at present from 14 feet 6 inches to 16 feet of water, hence a constant temptation to load too deeply for the water. This spring two large English companies—the London Assurance and the Commercial Union—started in to compete with New York brokers on this steel business, and forced the rate down to 2⅝ per cent. New York and Philadelphia brokers have for several years been a demoralizing factor on the lakes, but have never before been aided by local talent. This sort of thing will probably continue until companies are either tired of losses or of being represented on the lakes by shipowners."

The foregoing was undoubtedly written by a general agent who was not very successful last spring in securing a part of the insurance on steel boats. While it is true that heavy losses on steel vessels are incurred through these vessels stranding in connecting channels, the figures as to the season's premiums and the losses therefor are certainly incorrect. The loss of two steel vessels by collision early in the season, which was a rare occurrance, is not of sufficient importance to warrant the assertion that the business of insuring steel hulls is being done at a loss, even if rates are somewhat lower than during previous years. The writer of this letter evidently had a personal end in view and has shielded his identity, so that there is no use discussing the figures he presents.

Improvements in Portage Lake Canals.

G. A. Marr, assistant engineer in charge of the Portage Lake ship canals, sends the REVIEW a statement regarding improvements in the canals that will interest all vessel masters trading to Lake Superior. In this connection it may be well to note that the plural "canals" as used in this case refers to the four cuts in Portage river as well as the upper canal. Mr. Marr says:

"A large bar, consisting mostly of boulders, has been removed from just outside the piers at the Lake Superior entrance to these canals, and there is now a depth of 20 feet for over 100 feet wide on the line of the canal, so that vessels can expect to be able to come in through these canals to avoid storms. Since the hard material between the mouth of Snake river, and to and including cut No. 4, has been removed by dredging this season, there is an available channel for all vessels that can pass through the St. Mary's Falls canal, as at the present stage there is at full depth of over 15 feet, both through Portage river and the upper canal. Three dredges are still at work removing shoal points and widening the main channel, so that before the close of navigation it is expected that there will be sufficient width and depth at all points for vessels, rafts, etc., to pass each other freely. Cut No. 1 at Portage entry has been widened and deepened so that vessels should be able to enter easily by keeping near the proper range."

Electric Apparatus on the St. Louis.

On the American line steamer St. Louis electricity is used for a "tell-tale" at the navigating bridge and in the chief engineer's room, to indicate the revolving speed of the engines. Acceleration in speed of the shaft increases the current passed to the "tell-tale," and thus operates the indicator. The movements of the rudder are similarly recorded. To the rudder-head is a pointer which is moved over a contact plate, completing a circuit at each point, and thus indicating the movement of the rudder on the dial at the captain's bridge. An electric motor is also used for driving the pumps for the big pipe organ. The lighting plant and the motors used for refrigerating apparatus are described in the REVIEW of Nov. 15-22, 1894.

"For ventilating the compartments where passenger cabins are situated, there are four stations, each with two fans, one for exhausting and the other for supplying air. These fans are of the Sturtevant pattern and driven by several electric motors. The exhaust trunks are carried to each state room, while the supply fans discharge into the coridors and passages, to pass thence through the jalousies of the doors. The fans, as a rule, are 5 feet in diameter, and may run to 470 revolutions. The air supplied may, in winter weather, be passed through a casing with a large series of steam pipes supplied direct from the boiler. There is a valve by which the amount of steam may be varied to suit any temperature of air desired. The radiator pipes are in five sections, each controlled by a valve. There is, however, no corresponding means of cooling the air, although a cooling process has been adopted in other vessels.

Increasing Interest in Belleville Boilers.

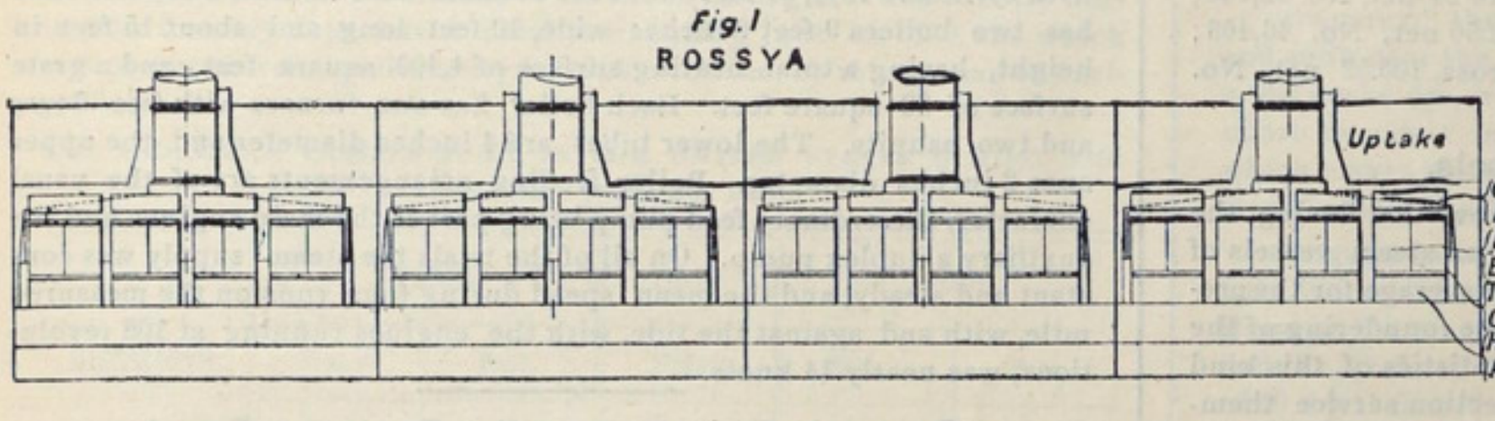
Since the meeting of naval architects in Paris a few weeks ago, ship building journals of London have all given considerable space to describing special features of the French Belleville boilers. Engineering of June 29 devotes four pages to illustrations and reading matter regarding the application of these boilers to the British protected cruisers Powerful and Terrible, and the Engineer, another of the leading technical publications, describes the boilers of the Rossya, a Russian cruiser, which has thirty-two generators in groups of eight each, as shown in the sketch appearing herewith. In the case of this vessel the entire horse power is 14,500, so that each generator produces about 450 horse power. The tubes are of steel, lap-welded, and 1½ inches in thickness. Tubes are sometimes made of the best charcoal iron. In describing the boilers for this cruiser, the Engineer, with the aid of the accompanying sketches, makes a very clear statement of the arrangement of the generators and the advantages claimed for them.

The arrangement is briefly as follows: The boilers are composed—(1) Of generating elements of which the number and dimensions vary according to the power of the boilers. Each element is composed of tubes joined by junction boxes—sketches Nos. 2 and 3. The tubes are screwed into the boxes, and communicate from base to summit. Each element forms a continuous worm, of which all the tubes are inclined upwards, so as to facilitate the disengagement of the steam. Each of the elements is removable, independently of the others, and forms a distinct unit. (2) Of a tubular feed-collector above the doors of the furnace, acting as a base to the front part of the elements, and communicating with each of them. The feed-collector distributes the water to the elements by junctions with conical joints, very easily taken to pieces, and only fastened with a single bolt. (3) Of a collector-purifier of steam and feed water, placed above the boiler, apart from the effects of heat and corrosive action of the gas. This has as many orifices as there are elements in the boiler. It communicates with these at the top by conical joints fixed with two bolts. The dismounting of an element only requires, therefore, the removal of three bolts, and is quickly done. The purifier receives the feed-water; this water is traversed and energetically stirred up by the steam going out of the elements, and rapidly heated, causing the precipitation of the calcareous salts in powder. The purifier is furnished with divisions, as shown in sketch, Fig. 4, which completely separate the steam from the vesicles of water, and from the foreign bodies which it might contain on leaving the elements. The purifier has a tube for return water at each end, which leads to ejectors of calcareous deposits. These return tubes also permit of an easy return to the generator of the feed-water injected into the purifier as well as of the water separated from the steam by this apparatus. (4) Of the two ejectors. These retain the calcareous salts precipitated, and the salts, or their residue, are extracted during the process of circulation by a special tap at the base. (5) Of an automatic feed and water level regulator, furnished with a warning whistle. This regulates the supply of water to the boiler; it secures regularity of feed and of height of water-level in the elements of the same boiler, whatever may be the speed of going, or the volume of water evaporated. (6) Of an automatic draught regulator, which accelerates or moderates combustion, according as the pressure lowers or rises. (7) Of a shell of iron and fire-bricks enclosing the generating elements and the hearth. This shell, which is of simple and solid construction, has doors for the hearth, as well as doors for easy access to all parts of the generating tubes. No space is required outside it at sides or back. All is worked from the front. (8) Of a hearth situated beneath the piles of tubes or elements. It has grate bars, and is surrounded with fire-bricks.

In addition to complete safety, freedom for dilatation of tubes, facilities for cleaning, solidity of joints, forced circulation, etc., the automatic feed and reduction valves, also illustrated among the sketches, are important features of these boilers. The automatic regulator of feed consists of a balanced valve, which regulates the introduction of the water into the generator. This valve is actuated by a float enclosed in a water-level column, communicating with top and bottom of generating elements. The rise and fall of the water surface in the level column are transmitted by the float to the balanced valve, and this opens a section for the passage of the feed-water, larger or smaller, according as the level descends or rises. When the normal condition of evaporation is established the mean level of the water in the generator remains constant so

long as the feed-pump furnishes water in sufficient quantity. The reduction valves serve to limit the pressure of steam coming from the boilers. So long as the pressure above the reduction valve is greater than that which the valve is set to, the reduction valve maintains a constant pressure in the steam pipe, whatever may be the variations of the pressure above. The reduction valve is of brass, bronze, or steel, according to the pressure of steam employed, and has two orifices for the entrance and exit of the same. Within is a bronze sheath pierced with apertures, in which works a cock bearing evenly with the apertures in the sheath. When the ports in the cock correspond with those in the sheath, steam passes through. The cock is hung by a double joint to a piston, which goes through a stuffing box of which the stuffing—lubricated with a grease called "Pate antifriction Belleville"—is very soft. The steam which has escaped from the ports of the valve acts under this piston and raises it. The piston is held down by a lever, upon which act springs that can be regulated as required, according to the pressure that one wishes to give to the steam. The reduction valve remains in equilibrium so long as the conditions of working are the same. But if we increase the expenditure of steam from the generators, or if the pressure above the valve decreases, the ports do not deliver any longer a sufficient quantity of steam, the lift under the piston diminishes, the action of the springs preponderates, and the piston sinks, while opening a larger section of the ports. Steam passes in greater quantity, and the pressure downwards of the valve is restored to its normal degree. The contrary takes place if the expenditure of steam from the generators is diminished, or if the pressure lifts the valve upwards. Reduction valves can be constructed for all requirements.

The feed pumps are also peculiar. The steam cylinder and the body of the pumps are mounted opposite to one another upon a tubular mounting, fixed by straps. The two piston-rods are connected by a coupling link, which acts at each end of the travel upon an arm oscillating around an axis, whose upper extremity actuates the slide. The pump is double-acting and has multiple valves; for each size of pump the number of valves rises from two to eight. These feed pumps can deliver from 165 gallons up to 22,000 gallons of water per hour according to their power. They are constructed to be worked incessantly and without repacking. If the feed regulator is shut, the pump travels very slowly, but it never stops altogether. At each end of the pump is a valve with a stem passing through the cover. This seals a little aperture, which makes the corresponding end of the pump communicate with the suction pipe. The spindle of the valve is met by the piston towards the end of its travel. The piston pushes the spindle, which opens the aperture, and the compressed water in the body of the pump is passed back into the suction pipe. The piston finds itself thus relieved of part of the resistance and gets an accelerating motion, which is communicated to the coupling link and to the "fork," so as to move the slide valve. The slide valve has a stroke of only about a quarter of an inch, and is driven direct by a rocking lever. The pump cannot stick with the valve half thrown because the removal of resistance at the end of the stroke in the way described ensures the completion of the pump stroke.



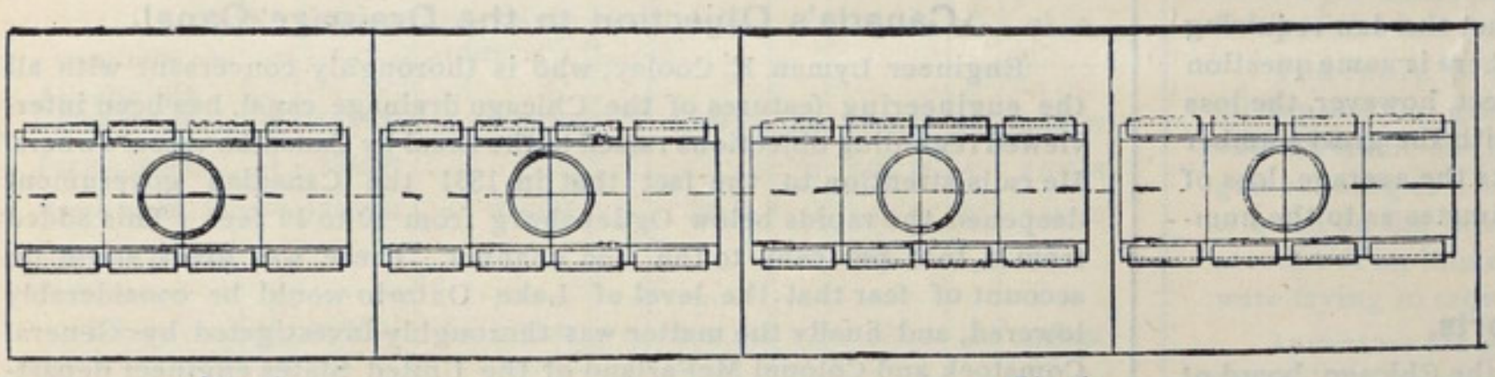
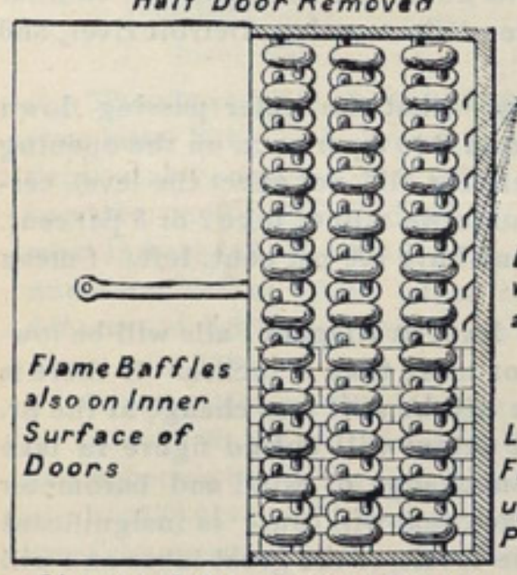


Fig. 2.
Interior of Belliville Boiler with Half Door Removed


Flame Baffles
Elements with Junction Boxes at each End of Tubes
Flame Baffles also on Inner Surface of Doors
Lined with Fire Bricks up to this Point.

Shewing 3 Elements or Stacks of Tubes.

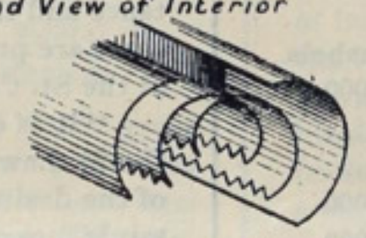
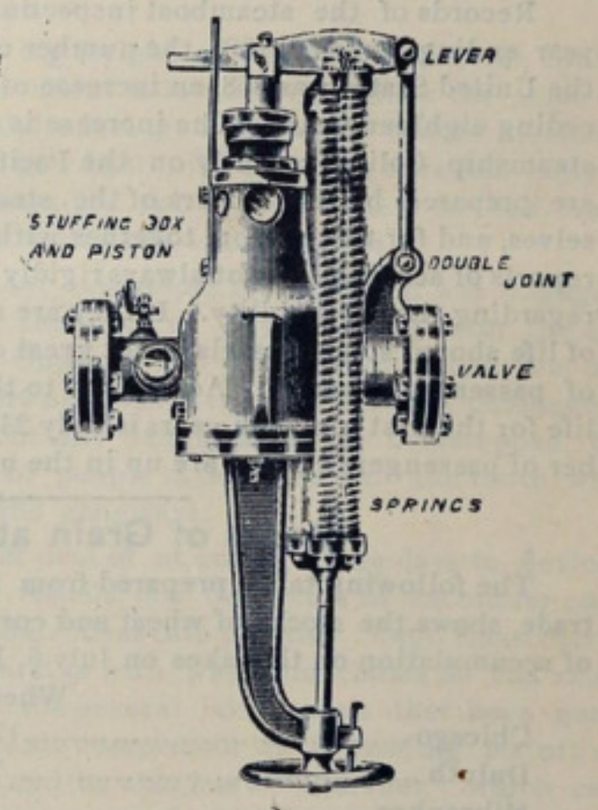
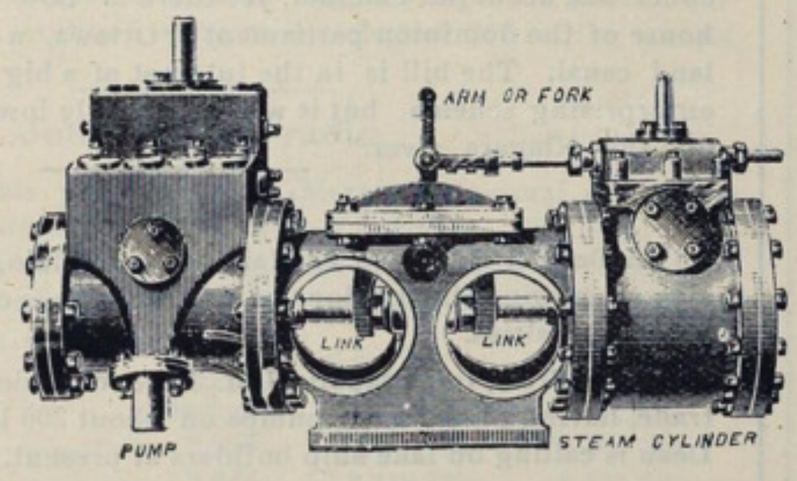
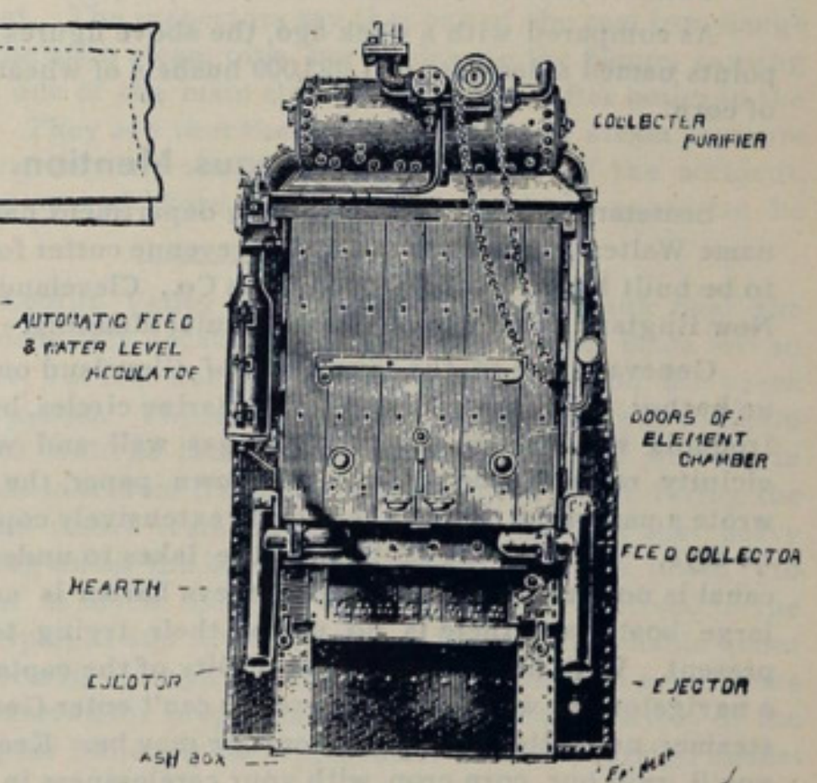


Fig 4
Collector Purifier
End View of Interior

Fig 3
Junction at End of Two Tubes







SKETCHES SHOWING ARRANGEMENT AND OTHER DETAILS OF BELLEVILLE WATER TUBE BOILERS.

Official Numbers and Tonnage.

New lake vessels registered by the bureau of navigation, treasury department, during two weeks ending July 6, 1895, are: Steam—Islander, Grand Haven, Mich., 291.15 tons gross, 174.55 net, No. 100,601; B. B. Inman, Duluth, Minn., 89.03 tons gross, 60.55 net, No. 3,651; Jamea Kennidy, Buffalo, N. Y., 10.80 tons gross, 7.35 net, No. 77,190; Sydney T. Smith, Milwaukee, Wis., 70.88 tons gross, 20.15 net, No. 116,679. Sail—A. W. Comstock, Port Huron, Mich., 805.90 tons gross, 777.85 net, No. 107,177; Diana, Chicago, Ill., 12.36 tons gross, 11.74 net, No. 157,425; Two Brothers, Chicago, Ill., 8.53 tons gross, 8.10 net, No. 145,695. Unrigged—Frank Gokey, Oswego, N. Y., 117.21 tons gross, 111.35 net, No. 37,554; Hon. Edward Wemple, Oswego N. Y., 116.04 tons gross, 110 24 net, No. 42,749; John Clune, Oswego, N. Y., 118.42 tons gross, 112.50 net, No. 46,463; William P. Murphy, Oswego, N. Y., 111.07 tons gross, 105.52 net, No. 62,946.

Loss of Life on Steam Vessels.

Records of the steamboat inspection service show that during the year ending June 30, 1895, the number of lives lost on steam vessels of the United States was 368, an increase of 128 over the average for the preceding eighteen years. The increase is charged to the foundering of the steamship Colima recently on the Pacific coast. Statistics of this kind are prepared by the officers of the steamboat inspection service themselves, and for this reason, together with the fact that the law requiring reports of accidents is not always rigidly enforced, there is some question regarding their reliability. If they are nearly correct, however, the loss of life aboard steam vessels is not great compared with the great number of passengers carried. According to these reports the average loss of life for the past nineteen years is only 247, while estimates as to the number of passengers carried are up in the millions.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on July 6, 1895:

	Wheat, bushels.	Corn, bushels.
Chicago	17,127,000	3,476,000
Duluth	7,580,000	.....
Milwaukee	296,000	.....
Detroit	277,000	125,000
Toledo	252,000	206,000
Buffalo	1,195,000	305,000
Total	26,727,000	5,102,000

As compared with a week ago, the above figures show at the several points named a decrease of 1,093,000 bushels of wheat and 397,000 bushels of corn.

Miscellaneous Mention.

Secretary Carlisle of the treasury department has decided to give the name Walter Q. Gresham to the new revenue cutter for the lakes, which is to be built by the Globe Iron Works Co., Cleveland. The boat for the New England coast will be named Daniel Manning.

Geneva is one of the towns east of Cleveland on Lake Erie that has no harbor. It is seldom heard of in marine circles, but when the steamer Iroquois was headed for a lighted gas well and went ashore in that vicinity recently the editor of the town paper, the Geneva Free Press, wrote a paragraph that has been quite extensively copied. "Once for all," he says, "we wish the captains of the lakes to understand that the ship canal is not yet completed, and Geneva harbor is unprepared to receive large boats, and there is no use of their trying to make this port at present. With due respect to the ability of the captain of the Iroquois as a navigator, we will say right here, he can't enter Geneva harbor with his steamer, no matter how persistent he may be. Keep off, gentlemen, or you'll ruin our corn crop, with your carelessness in straying around on our farms. Anyhow, we're going to pass an ordinance prohibiting unmuzzled steamboats from trespassing on improved farms."

A five-masted steel sailing vessel recently launched at Bremen for a Hamburg firm of ship owners is a novelty in these days of big steam craft. She is named Potosi and is 394 feet over all, 49 feet 9 inches beam and 31 feet 2 inches depth of hold. Her carrying capacity is about 8,500 tons, and a crew of forty-four will be required to man her. She has steel decks, steel rudder and all other late features of hull construction that are characteristic of the best class of steamers. Her rig will be that of a five-masted bark, with double-maintop and maintopgallant yards. The masts and the larger yards are of steel, the height of the mainmast, from keel to truck being 210 feet, and its diameter at the deck 34 inches. All the standing tackle is of galvanized steel wire, and the running gear partly of wire and partly of hemp. The spread of canvas, with all sail set, will be equal to about 5,000 square yards. In addition to large capstans for raising anchors (anchors weigh about three tons), there are two others on the main deck, a large one on the forecastle, two on the bridge deck, and a small one on the poop deck, besides thirteen winches for working the sails and loading and unloading cargo.

Fourteen Knots from an Ordinary Vessel.

Special interest attends trials just now of all vessels fitted with water tube boilers. A freight steamer, the Hero, built by Earle's Ship Building & Engineering Company of Hull, England, and fitted with Babcock & Wilcox water tube boilers, was given a series of trials recently. The boat is 217 feet between perpendiculars, 30 feet beam, 13 feet 8 inches depth of hold and of 775 tons gross register. Her engines are triple expansion with cylinders 18½, 31 and 53 inches diameter and 33 inches stroke. She has two boilers 9 feet 6 inches wide, 10 feet long and about 15 feet in height, having a total heating surface of 4,400 square feet, and a grate surface of 88 square feet. Each boiler has one furnace with two doors and two ashpits. The lower tubes are 4 inches diameter and the upper ones 2 inches diameter. Boiler feeding arrangements are of the usual character, the ordinary feed pump being part of the main engines and the auxiliary a duplex pump. On all of the trials the steam supply was constant and steady, and the mean speed during four runs on the measured mile, with and against the tide, with the engines running at 108 revolutions, was nearly 14 knots.

Canada's Objection to the Drainage Canal.

Engineer Lyman E. Cooley, who is thoroughly conversant with all the engineering features of the Chicago drainage canal, has been interviewed regarding objections raised to the canal by Canadian vessel owners. He calls attention to the fact that in 1881 the Canadian government deepened the rapids below Ogdensburg from 10 to 16 feet. This added from 6 to 8 per cent. to the free channel. There was great alarm on account of fear that the level of Lake Ontario would be considerably lowered, and finally the matter was thoroughly investigated by General Comstock and Colonel McFarland of the United States engineer department. The conclusion was that the effect would extend to no great distance and that the level of Lake Ontario would not be impaired. Similar cases are presented, he says, at the Lime-Kiln crossing, Detroit river, and at the St. Clair flats.

"It is estimated," said Mr. Cooley, "that the water passing down the St. Lawrence will be diminished from 2 to 3 per cent. on the opening of the drainage channel. If 6 to 8 per cent. did not affect the level, certainly 3 per cent. will not. But, of course, we cannot take 2 or 3 per cent. of the water away from 100 per cent. and have 100 per cent. left. I mean that the decrease will be immaterial.

"Experts estimate that the water level at Niagara Falls will be lowered from 2½ to 5 inches—probably not more than 4 inches. If there is 4 inches of difference at Niagara there will be still less change at the St. Lawrence rapids. A variation of that extent will cut no figure in lake navigation, for the actual variation from change of wind and barometer is far greater. The reduction which the canal will cause is insignificant beside the actual daily variations in the levels of the great lakes and will hardly be noticeable along the St. Lawrence. The Canadians are greatly concerned about our channel, yet there is now pending in the second house of the dominion parliament at Ottawa, a bill to enlarge the Welland canal. The bill is in the interest of a big water power. It is an enterprising scheme, but it will necessarily lower the level of Lake Erie and the Niagara river."

Trade Notes.

McBean & Edge, No. 33 Main street, Buffalo, have issued a neat catalogue showing illustrations of different kinds of signal lamps, and their other specialties.

Dean Bros., Indianapolis, Ind., have considerable to do with the lake trade, having placed their pumps on about 300 lake steamers. Mr. Tom Dean is calling on lake ship builders at present.

Always original, the Joseph Dixon Crucible Company of Jersey City, N. J., sends out a combination calendar and blotter for July with brownies and firecrackers illustrating features of the national holiday.

Albert Fisher of the firm of Fisher & Porter of Chicago, western representatives of the Bethlehem Iron Company, has been in the city during the past week looking after the interests of the big Bethlehem institution. Mr. Fisher reports business very good. Orders are coming thick and fast, he says, notwithstanding a material advance in the price of labor and raw material and a consequent advance of prices. Recent orders for large shafts, both hollow and solid, of this company's fluid-compressed, hydraulic-forged, open-hearth steel give evidence that the merits of this class of work are being recognized by leading engine and machine builders of the west.

The two gas buoys at Erie will be used to mark the inner turning point, taking the place of the can buoy, No. 8. One of the gas buoys is for the relief of the other.

Still Leading in Steel Construction.

The tonnage of twelve steel vessels built on the lakes during the year ending on the 30th of last month was practically equal to the tonnage of steel vessels built in all other parts of the country during the same period. Although twenty-four steel vessels were built during the year on the Atlantic and Gulf coasts, western rivers and Pacific coast, their aggregate tonnage was only 23,978.22 tons, against an aggregate of 23,717.24 tons for twelve vessels built on the lakes. It is, of course, well known that the year just ended has been a very dull one in lake ship yards, so that the showing made by the lakes is the more important on that account. The foregoing figures were taken from the following table, which deals with ship building of all kinds throughout the country during the treasury department fiscal year ending June 30, 1895, and which was prepared from preliminary returns received by the bureau of navigation:

SAIL AND STEAM VESSELS BUILT IN THE UNITED STATES DURING THE YEAR ENDED JUNE 30, 1895.

DISTRICTS.	STEEL.				IRON.		WOOD.			
	STEAM.		SAIL.		STEAM.		STEAM.		SAIL.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and gulf coasts	18	20,770.07	1	69.02	7	3,300.73	109	9,613.57	307	45,765.77
Pacific coast	1	2,556.37	.....	.....	.....	.....	21	3,026.72	61	2,079.58
Great lakes	8	17,654.64	4	6,062.60	1	365.15	54	10,918.60	26	3,013.60
Western rivers	4	582.76	.....	.....	.....	.....	60	6,939.07	.....	.....
Total	31	41,563.84	5	6,131.62	8	3,665.88	244	30,497.96	394	50,859.25

	No.	Gross tons.
Total steam	283	75,727.68
Total sail	399	56,990.87
Grand total	682	132,718.55

The above table shows that 682 steam and sail vessels of 132,719 gross tons were built and documented in the United States during the last fiscal year, compared with 776 steam and sail vessels of 121,547 tons during 1894, an increase of 11,000 tons. Final and revised returns will somewhat increase the figures by the addition of barges, etc. Steam vessels numbered 283, of 75,728 gross tons, and sail vessels 399 of 56,990 tons, a decrease of 8,000 tons steam and an increase of 19,000 tons sail compared with 1894.

Construction on the Atlantic and Gulf coasts comprised 442 vessels of all kinds of 79,520 tons, compared with 562 vessels of 68,478 tons for 1894. Construction on the great lakes comprised ninety-three vessels of all kinds of 38,016 tons, compared with eighty-nine vessels of 40,372 tons. Steel construction in all parts of the country comprised thirty-six vessels, of 47,695.46 tons, compared with thirty-five vessels of 50,736 tons in 1894. The number of American vessels thus far officially reported as lost during the year comprised eighty-five steam vessels and 276 sailing vessels, barges, etc.

June Canal Traffic.

The number of boats passing the St. Mary's Falls canal during the past month was 530 more than during June of last year. The total number of vessels passing the canal during the month was 2,875 and the lockages 1,050. As compared with June, 1894, the items of passages, freight tonnage and registered tonnage are:

	Vessel passages.	Registered tonnage.	Freight tonnage.
June, 1895	2,875	2,637,636	2,209,046
June, 1894	2,345	2,119,731	1,842,369
Increase	530	517,905	366,677

Of 2,875 vessels passing the canal during the month, 1,922 were steamers, 848 sailing vessels and 105 rafts and unregistered craft.

John B. Herreshoff, the blind brother of "Nat" Herreshoff, designer of the Defender and other famous yachts, says that the centreboard which Americans have been accused of using in all of their fast yachts, was first brought out in England. It has been used here more on account of the shallow waters surrounding us, where the keel could not be used. The reason of the present departure from the centreboard, he says, is that the weight of the ballast can not be placed low enough down when the centreboard is used. Of late years the weight of ballast has been put as low down as possible, as in the Defender, where it is 19 feet below water line, and the buoyancy as high up fore and aft as possible, which gives the lines of the hull in true curves.

Around the Lakes.

F. W. Wheeler & Co., West Bay City, will launch the Eddy-Shaw boat, the first of the 400-foot steel steamers building at their yard, about August 1.

The charcoal iron furnace being built by the Cleveland-Cliffs Co. at Gladstone, Mich, is said to be the largest furnace of its kind in the world. It will not be completed for some time to come.

Phœnix is the name selected for the rebuilt steamer Waldo A. Avery, which will soon leave the Bay City dry dock. The boat will be owned by the Phœnix Transportation Company, composed of J. J. Rardon and others of Chicago.

Owners of the Canadian steamer St. Magnus, which was turned over and sunk near the mouth of the river in Cleveland while loading pig iron a few weeks ago, will probably be forced to go into the courts in their effort to collect insurance. A survey shows losses aggregating $21,000, which makes the vessel a constructive total loss. In her present condition the boat is valued at only $3,500.

Engines to be fitted to the big freight steamer for which the Globe Iron Works Co. of Cleveland is about to lay a keel, will be the same as those in the steamer Globe. Cylinders are 24,39 and 63 inches diameter and the stroke 42 inches. The new boat will, however, have four boilers of 10 by 11 feet dimensions, instead of two 16-foot boilers in the Globe. Each of the four boilers will have two 40½ inch furnaces.

The entire force of steamboat inspectors in Cleveland was engaged all day and the greater part of the night of July 4 looking after the excursion traffic on the steamers Superior and Duluth, which had just begun running to a summer resort near the city. The limit of passengers allowed on the boats was in constant danger of being overstepped, on account of an immense crowd of people at both ends of the route who were trying to crowd through the gangways.

Inventors are giving a great deal of attention these days to devices for finding and raising sunken vessels, but they seem to encounter considerable difficulty in putting their ideas into practice. Capt. Enos Petrie of Buffalo has patented an apparatus with which he claims he can raise the Norman, Cayuga or any of the several lake vessels that have gone down in deep water of late. An air compressor is the leading feature of his devices for raising vessels, and he also has a "searcher" which can be used in a 65-mile radius and by means of which he claims he can locate a vessel within that compass.

The investigation by local steamboat inspectors at Chicago regarding the fatal accident on the passenger steamer Christopher Columbus, while on a trip from Milwaukee to Chicago recently, has resulted in a clear bill of no fault for the boat. The inspectors say that one of the cast iron flange T connections on the main steam pipe burst close to the flange, causing the strain to break one of the main stop valves on the after boiler in the starboard battery. They add that there was no excess of steam pressure and that "therefore, they are unable to state the cause of the accident, except that it was one of those accidents for which no cause can be given."

Now that the Lehigh Valley line steamer Cayuga, sunk near the Straits, has been definitely located, arrangements will be made for an attempt to raise her, but it is not probable that operations on the wreck will be begun this season. The season of rough weather will come on before an expedition could be fairly started to work, and the wreck is in an open locality that is seldom free from unfavorable weather during the fall months. As the vessel rests on her side, it is thought that heavy chains may be swung under the bow and stern and the wreck towed into shoal water without as much difficulty as would be encountered if the the steamer stood upright and it was necessary to work the chains under the keel and flat bottom. Joseph R. Oldham of Cleveland has asked some of the wrecking concerns for proposals with reference to recovery of the boat. He is acting for Philadelphia representatives of the foreign underwriters.

Another lake chart has been issued by the hydrographic office, and the first prints of it are just at hand. It is a chart of St. Joseph's channel, with St. Mary's river from East Neebish to Mud lake. The price of it is 50 cents. This chart, as well as all other publications of the hydrographic office, may be had from the MARINE REVIEW.

OFFICE OF LIGHT HOUSE ENGINEER, Ninth District, Detroit, Mich., July 5, 1895. Sealed proposals will be received at this office until 3 o'clock p. m. of Thursday, the 1st day of August, 1895, for furnishing the materials and labor of all kinds necessary for the complete construction, erection and delivery of the Buoy Shed, Platform, Tramway, and Derrick for Light-House Depot, St. Joseph, Mich. Plans, specifications, forms of proposal, and other information may be obtained on application to this office. The right is reserved to reject any or all bids, and to waive any defects. M. B. ADAMS, Major, Corps of Engineers, U. S. A., Light-House Engineer. July 19

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,341 vessels, of 1,227,400.72 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons and over that amount on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1894, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,731	843,239.65
Sailing vessels	1,139	302,985.31
Canal boats	386	41,961.25
Barges	85	39,214.51
Total	3,341	1,227,400.72

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
Year ending June 30, 1890	218	108,515.00
" " " 1891	204	111,856.45
" " " 1892	169	45,168.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
Total	872	406,976.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of anal Officers.)

	St. Mary's Falls Canal.			SuezCanal.		
	1894.	1893.	1892.	1894.	1893.	1892.
No. vessel pass'ges	14,491	12,008	12,580	3,352	3,341	3,559
T'n'ge, net registd	13,110,366	9,849,754	10,647,203	8,039,106	7,659,068	7,712,028
Days of Navigat'n	234	219	223	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

FOLLOWING CLOSE upon the completion of the American liner St. Louis, orders were placed with the Cramps, the Newport News company and other ship builders on the Atlantic coast for half a dozen large freight and passenger steamers, so that now there are more merchant vessels building in coast ship yards than for years past. Of course the amount of ship building going on at these coast yards is not at all large compared with the steady operations of British ship yards, but what is noticeable about it is the variety in kind, vast improvement in appliances and nearer approach to the cost of European work. It is sufficient, also, to worry the British press. One of the London marine journals discussing the American ship building question says that "Yankee capital flows naturally into railway schemes, and large fortunes having been made on such ventures, railway magnates will prefer to stick to what they know about, and are not likely to put their capital into shipping with all its difficulties and attendant troubles, profits in that trade being rare and losses abundant." This certainly seems like a little whistling to keep up courage. A vast progress is being made in ship building throughout the entire United States and it is now evident, more than ever, that the time is not far off when the builders of this country will compete successfully with foreign builders.

FOR LOCATING the wreck of the Lehigh Valley steamer Cayuga, Capt. C. H. Sinclair of Chicago is to be paid $2,000 by a Philadelphia representative of the foreign underwriters who carried risks on hull and cargo. This sum would pay for enough cheap buoy devices to equip the whole fleet of valuable steel steamers on the lakes, any of which may meet with an accident similar to that which befell the Cayuga. Of course it will be intimated that somebody had definite knowledge of the resting place of the sunken boat, but the story of the successful search for her, published elsewhere in this issue, does not warrant any such claim.

IN HOW many cases, asks the Maritime Register of New York, where disaster to a steam vessel has caused loss of life, has an investigation been made that has obtained satisfactory results or information? We know of very few. In how many of such cases has punishment followed where punishment was deserved? We cannot remember one. But what else can be expected, where official inquiry into such cases is made by the very men who through their own office may have been the direct cause of the disaster! Official inquiry into steam vessel disasters, as now conducted, is simply a burlesque upon justice and an insult to common sense.

IT HAS BEEN suggested that at some points where keepers of light-houses and fog signal stations are employed the service might as well be performed by life saving crews. The light-house service is closely related to the treasury department and the life saving service is one of the bureaus of that department, so that there seems to be no good reason why this suggestion should not be carried out. The mission of the life savers is an important one but they lead a very inactive life, and there is much of the light-house work that might be done by them.

REFERRING to the sincere manner in which Gen. Poe insisted that lake vessel owners should give up all talk of erecting a memorial in his honor at Sault Ste. Marie, the editor of the Marquette Mining Journal says: "Gen. Poe is of the same sort of stuff as 'Pap' Thomas, who would not have presents. He is just as modest and unassuming as he was when, as Capt. Poe, he rode the highways and byways of Georgia in '64 and the writer hereof had the pleasure, many a day, of riding by his side."

A MILLION and a half tons of ore moved an average of about 850 miles, and most of it unloaded direct into railway cars for shipment to furnaces, all in thirty days! Such is the record of the lake ore trade thus far this season. Shipments of May and June aggregate more than 3,000,000 gross tons. This volume of business exceeds all estimates as to what might be done in the ore trade during a single season. If forced to it, the present facilities would probably admit of 10,000,000 gross tons of ore being moved in a season.

Underwriters Favor the Buoy Idea.

Reference has been made repeatedly to the advisability of all vessels carrying a buoy device of some kind that could be thrown overboard to mark a new obstruction, (many of which are found on the lakes each season) or that might prove valuable in marking the vessel carrying it, in event of an accident that might result in foundering, sinking from collision, etc. The idea of a wreck indicating buoy is, of course, not new. There are two or three patent buoys of this kind in the market, but it is probable that any captain could rig up, with little cost, a device that would serve the purpose. Just now attention is directed to this subject by expense incurred in finding the Lehigh Valley line steamer Cayuga, recently sunk near the Straits. With a view to obtaining the opinions of underwriters regarding this matter, the REVIEW wrote to a few of the general agents. Their answers follow:

P. H. Fleming & Co., insurance, freight and vessel agents, Chicago—"We do not think a case of total disappearance ever occurs without the thought presenting itself to us that it would be advisable for every vessel to carry a buoy device that might mark the location of the vessel. It certainly seems to us that the end would justify the means. Personally, we feel that it would be considerable of a satisfaction to us to know just where our boat was, even though she were gone beyond recovery."

Geo. L. McCurdy, Insurance Company of North America, Chicago—"I think we have in case of the Cayuga an example where such a device would have been of great assistance in locating the vessel, and no doubt other similar cases could be cited, so that it seems there is no question that, granted a device meeting the exigencies of such cases may be secured, it would be quite desirable to have it adopted by the lake marine."

J. S. Gadsden, general agent of the Ætna Insurance Co., Chicago—"We think the buoy device a capital idea and hope it will be carried out."

C. A. Macdonald & Co., general insurance agents, Chicago—"We certainly think the idea of all vessels carrying a buoy device, as suggested, is a very good one."

A Bay City correspondent informs the REVIEW that arrangements are being made to carry out an elaborate test of engines and boilers on the new Davidson steamer Rappahannock, by some of the engineering students of the Michigan Agricultural College, under the direction of Prof. Weil of the college and Mr. H. Penton of the Frontier Iron Works, Detroit. The Rappahannock is fitted with triple engines, which were built by the Frontier works and have cylinders 20, 32 and 54 inches diameter with 42 inches stroke. Her two boilers are each 12 feet 3 inches diameter and 12 feet long, working with forced draft.

CAPTAINS AND MATES ARE INVITED TO CALL AT THE OFFICE OF THE MARINE REVIEW, AND LOOK OVER THE SAILING DIRECTIONS OF LAKES SUPERIOR, HURON AND MICHIGAN, PUBLISHED BY THE HYDROGRAPHIC OFFICE.

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In General.

The North Sea and Baltic canal was at the opening ceremony named Kaiser Wilhelm canal.

It is reported that the Cramps are about to close an order for a steam yacht that will be 350 feet long, 44 feet beam, 20 feet extreme draft and of speed greater than that of any large craft afloat.

The Herreshoffs are said to be anxious to design and build a very fast torpedo boat for the government. It is thought that a proposition from them to produce a 27-knot vessel will be made public when bids for the three new torpedo boats, authorized by the last congress, are called for shortly.

A company with a capital of 700,000 francs has been formed in Paris to build, as an experiment, a steamer of ocean going size on the plans of M. Bazin for a roller boat. The idea is to mount the vessels on enormous hollow wheels or cylinders, and thus not to "plough" the ocean, but to roll over it.

Referring to the interest shown in Japan in the proposed cable from the islands of that country to the United States, the Review of Reviews says: "With our increased resources it ought to be possible for us to dig a Nicaragua canal, lay a cable across the Pacific, or carry out a dozen other enterprises of equal magnitude."

In 1885 France was the leading producer of aluminum. In 1886 Germany took the lead, and in 1889, England. Since 1890 Switzerland has outstripped the world. During 1894, however, only three countries were producers—France, 10 per cent.; Switzerland, 60 per cent.; the United States, 30 per cent. The price per pound has gone from $12 in 1885 to 35 cents in 1895.

Builders of the turret type of freight steamer in Sunderland, England, seem to be more successful in securing orders from ship owners than are our own builders of the whalebacks, who have been working almost entirely on their own account. Messrs. Wm. Doxford & Sons, who build the turret ships, have been working on orders from half a dozen owners of Great Britain, and recently they secured a contract from a Spanish firm. Two of these boats now building are to be fitted with the Ellis & Eaves system of induced draft.

British naval authorities have been giving attention to the plans of Commodore Melville of the United States navy for using both water tube and Scotch boilers in naval vessels. At the recent meeting of naval architects in Paris, Sir William White, who is connected with the British admiralty, said that the plan of using a combination of return tube boilers and water tube boilers had been thoroughly considered in designing the big protected cruisers Powerful and Terrible, but it was concluded that such a system was not desirable for these ships.

Now it is announced that the Columbia, crack naval vessel, has not, after all, been ordered to cross the Atlantic on her return from Keil at extreme speed. Such speed, Secretary Herbert says, could only be attained by using forced draught all the way across, and to do this would require a larger force of engineers, firemen and oilers than are now on the ship. To ascertain what the ship is capable of doing in her present condition, she has simply been ordered to use all her boilers in coming across, but not to put on forced draught until during the last twenty-four hours.

Chief Naval Constructor Hichborn has endorsed the recommendation of Naval Constructor Hanscom that the navy take steps looking to the securing of the right to use a process for making wood fireproof. This recommendation is the result of several months' experiments at the Boston navy yard. The sap of the wood is extracted in vacuum in large iron tanks, and the pores of the material are then filled under a heavy pressure by a composition of borax, boracic acid and other chemicals. Thus treated the wood may be subjected to flame without taking fire. The texture of the wood and its color are unchanged. This wood will probably be used for portions of ships not subject to danger from splinters.

Pride taken by vessel owners in the 400-foot freight steamers now building at several lake ship yards is pardonable, but these vessels are small when compared with some of the modern ocean-going freighters. Harland & Wolff, famous builders of Belfast, have just launched for the White Star line a twin-screw freight steamer that will carry 14,000 or 15,000 net tons. She is named Georgic and will trade between Liverpool and New York. Accommodations for about 900 head of cattle are provided on a single deck. Another big vessel launched "on the other side" recently is the Cavour, built at Middlesbrough on the River Tees. Her dimensions are 425 feet keel, 51½ feet beam, and 30½ feet hold, and her deadweight capacity is about 7,500 net tons.

The Nickel Plate road has compiled a list of country homes along the south shore of Lake Erie, willing to accommodate summer boarders, and a copy will be mailed to any address by enclosing a stamp to any agent of the Nickel Plate road, or to B. F. Horner, general passenger agent. Aug. 31—265

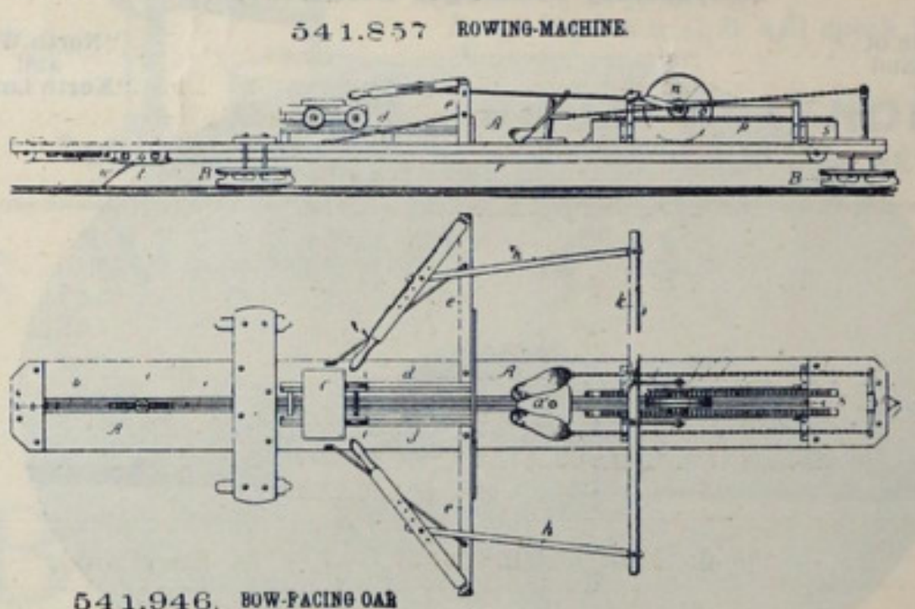
Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

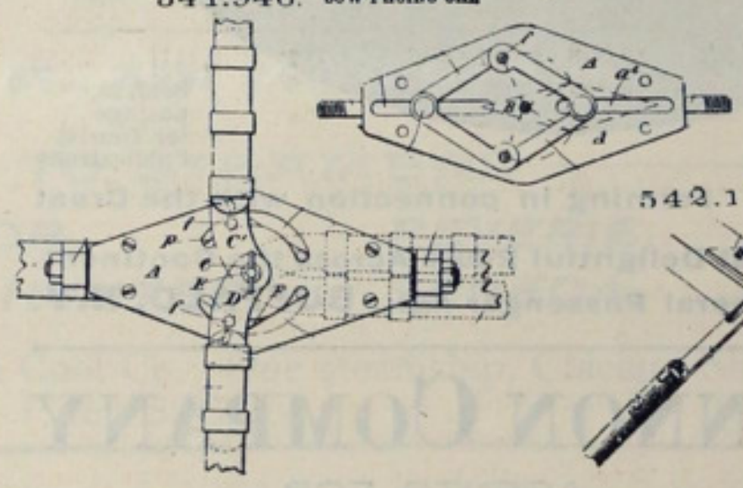
541,857. Rowing Machine. Edward C. Hinton and William H. Stansfield, Owasco, N. Y. Filed Aug. 10, 1893. Serial No. 482,799.

Claim. In a rowing machine, the combination with a main frame slotted centrally nearly its entire length, supporting shoes or runners for said frame, a cross-bar rigidly secured to the frame midway its length and forming outriggers, oars pivoted to the ends of said cross-bar, sliding seat mounted in guides in proximity to said oars, a reciprocating cross-bar near the front of said frame, connecting rods joining said oars and reciprocating cross-bar, a grooved wheel journaled in supports rigid with said reciprocating bar, driving pinions on the shaft of said wheel, racks on either side of the wheel, which racks are engaged by said pinions, to rotate the wheel as the reciprocating cross-bar is moved forward and backward by the oars, an endless belt running lengthwise the frame and encircling the said grooved wheel, a sliding block carrying a driving spur mounted in the central slot of the frame and connected with said endless belt, a pivoted foot rest mounted just in front of said sliding seat, and connections between said foot rest and the forward supporting shoe, whereby the position of the latter can be varied at will and the course of the machine controlled.

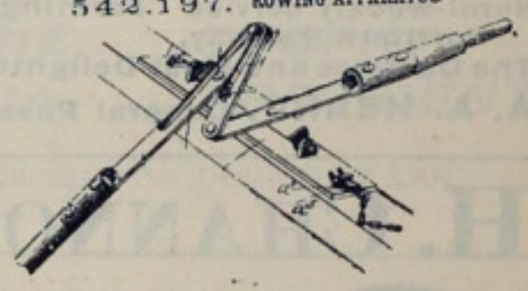
541.857 ROWING-MACHINE.



541.946. BOW-FACING OAR



542.197. ROWING APPARATUS.



541,946. Bow Facing Oar. Edward Pink, Stanton, England. Filed Feb. 18, 1895. Serial No. 538,863.

Claim. In an improved rowing apparatus, the combination with a rocking case longitudinal and circular slots in the case and a jointed parallelogram retained in the said case, with guiding pins passing through the longitudinal slots of arms pivoted to a central pin on the case and projecting in the opposite direction, connected to the jointed parrallelogram by pins passing through the circular slots, oar and handle fitted to the opposite arms and rollers on the under side of the said arms bearing on the upper surface of the case.

542,197. Rowing Apparatus. Emil Kindscher, Brooklyn, N. Y. Filed July 14, 1894. Serial No. 517,593.

Claim. A bow-facing rowing apparatus, comprising a plate to be rigidly but removably fastened upon the gunwale of a boat, a rock-shaft having its pivotal ends journaled in bearings in posts or lugs on the gunwale plate, a hand-extension or lever and a blade-extension or lever, the hand and blade-extension or levers pivotally mounted upon the rock-shaft and joined together by a connecting-link which is pivoted to the outer end of the hand-extension or lever and to the inner end of the blade-extension or lever, a spring acting to open the connecting-link and the blade-extension or lever, sockets or plates on the end of the hand and blade-extensions or levers, designed to hold a handle and an oar-blade in their proper ends, and means for holding the gunwale-plate in place.

A CHART COVERING LAKE HURON, GEORGIAN BAY AND THE STRAITS OF MACKINAC, ALL ON ONE SHEET, HAS BEEN ISSUED BY THE HYDROGRAPHIC OFFICE AND MAY BE HAD FROM THE MARINE REVIEW AT 75 CENTS. LAKE SUPERIOR ON ONE SHEET IS ALSO IN PRINT AND SELLS AT THE SAME PRICE.

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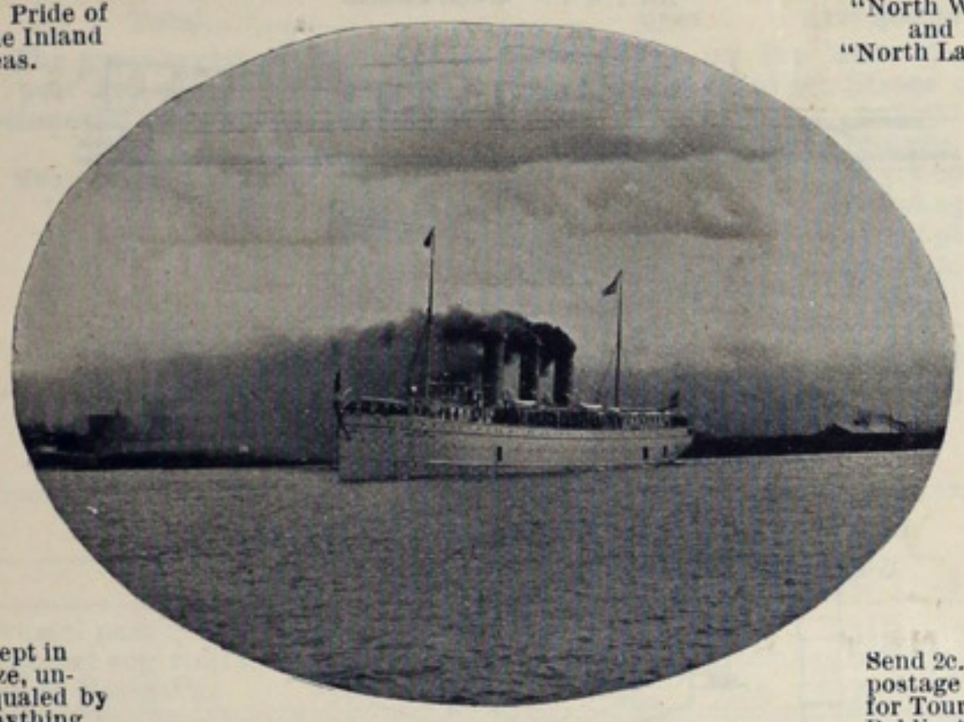

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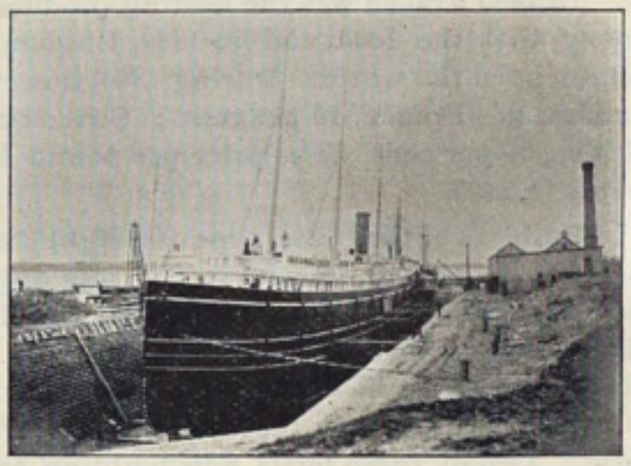

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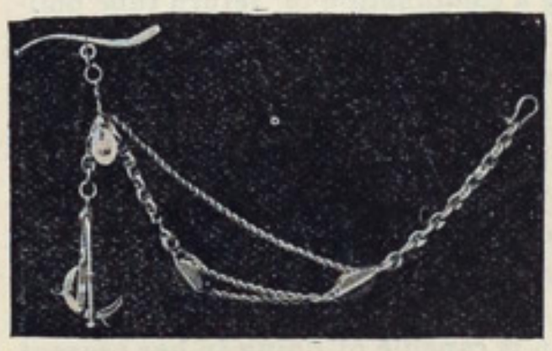

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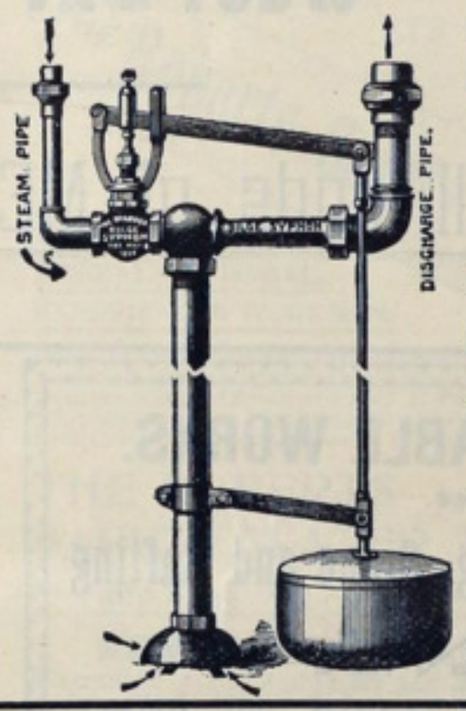

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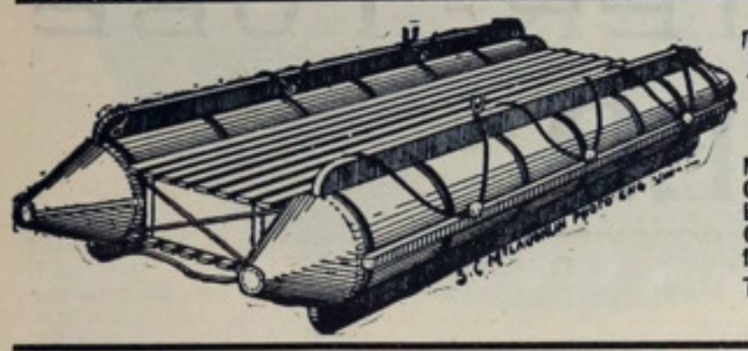

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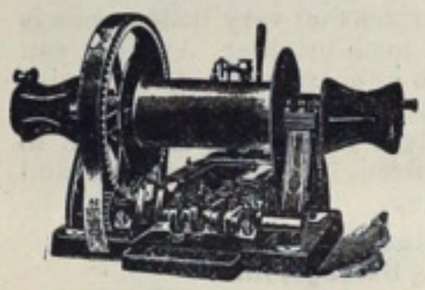

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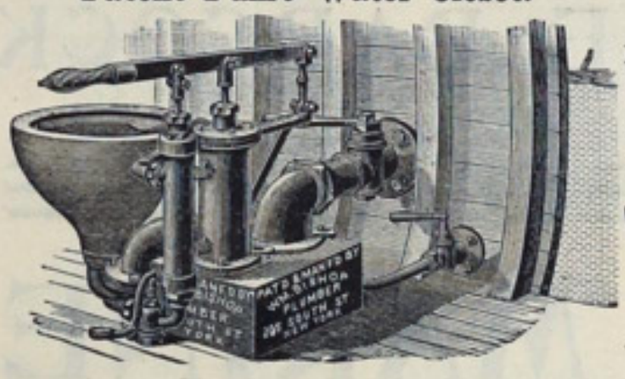

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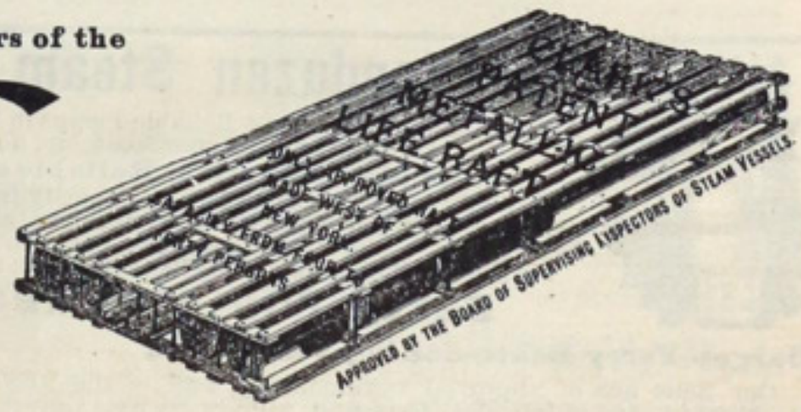

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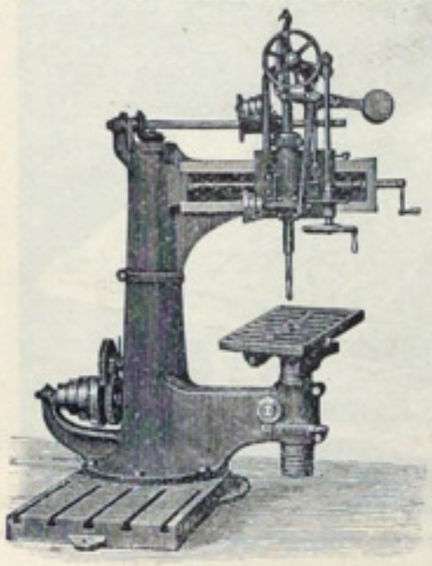

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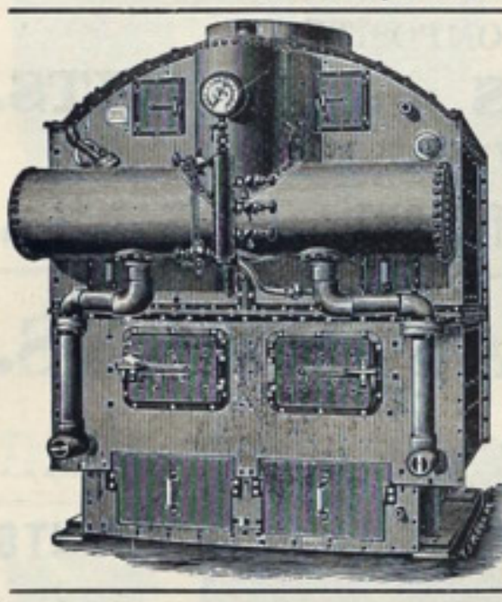

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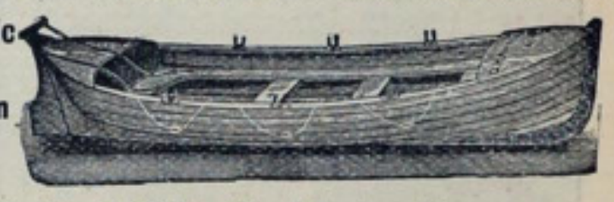

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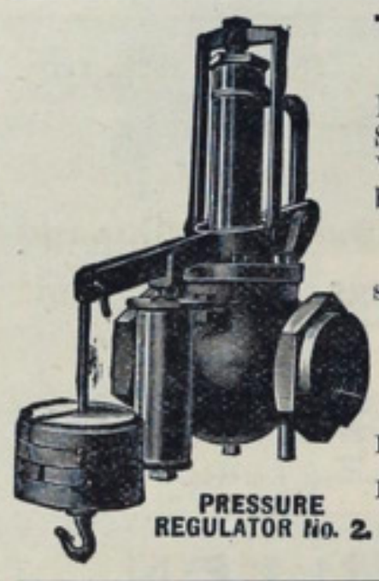

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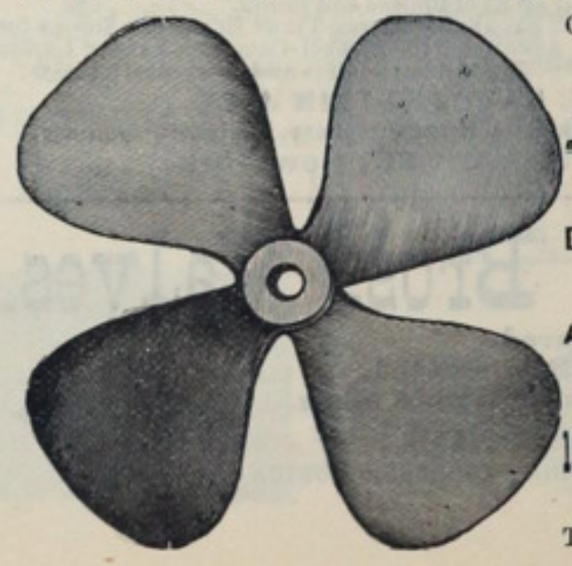

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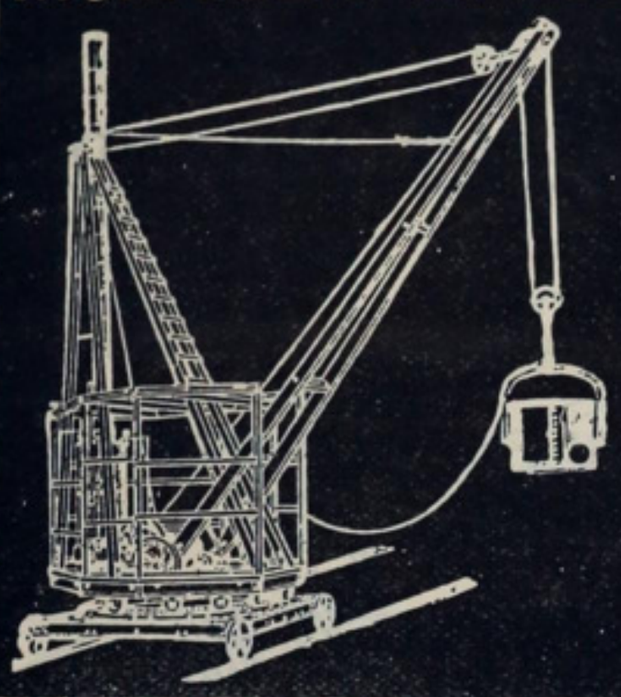

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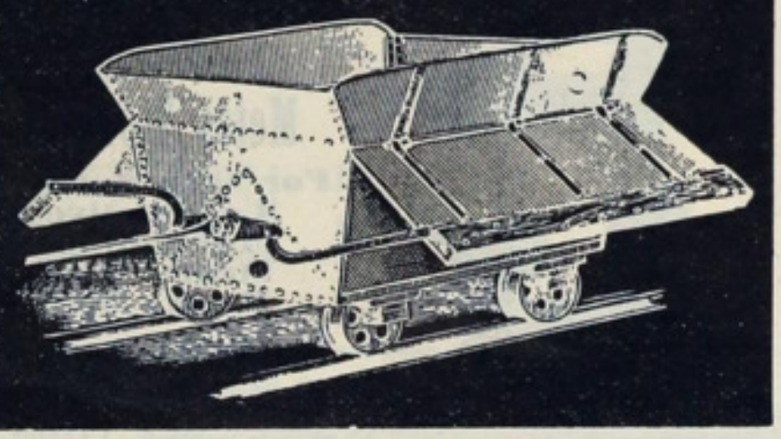

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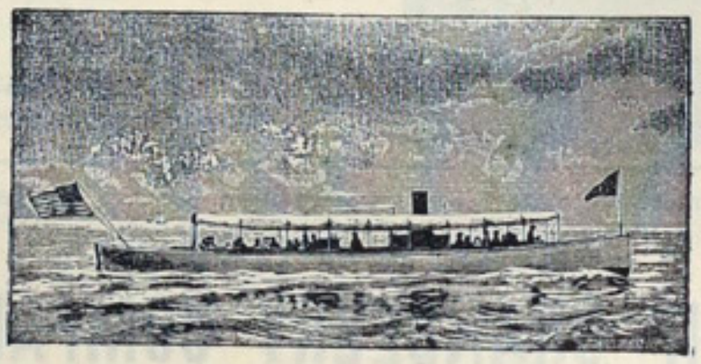

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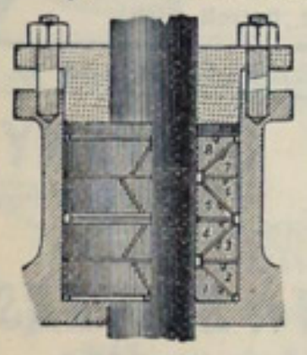

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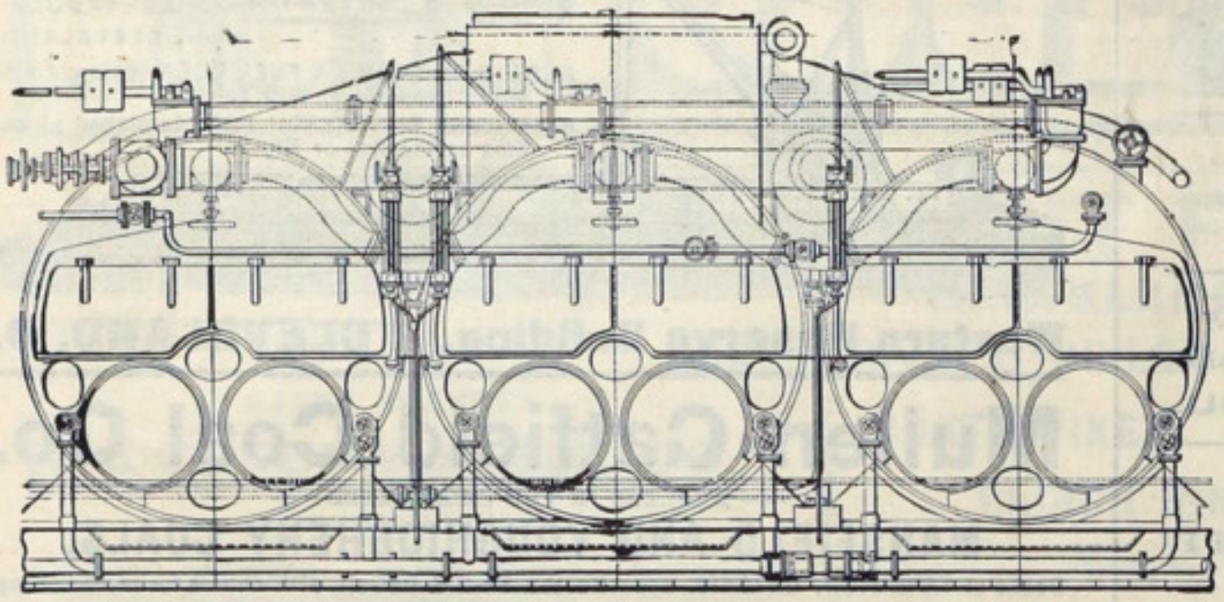

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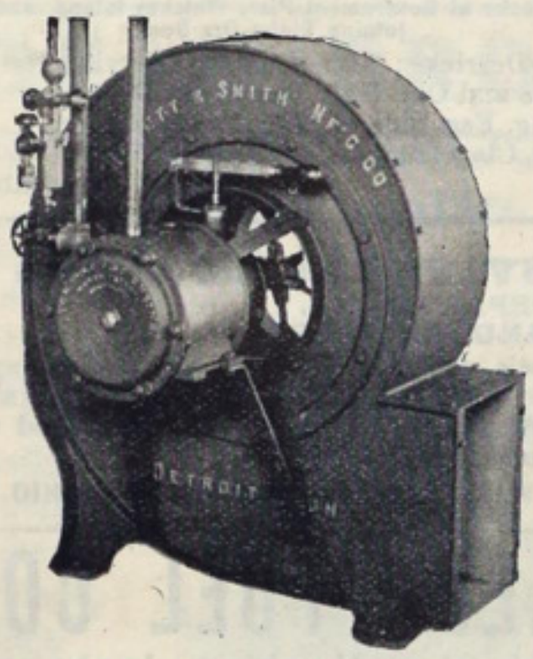

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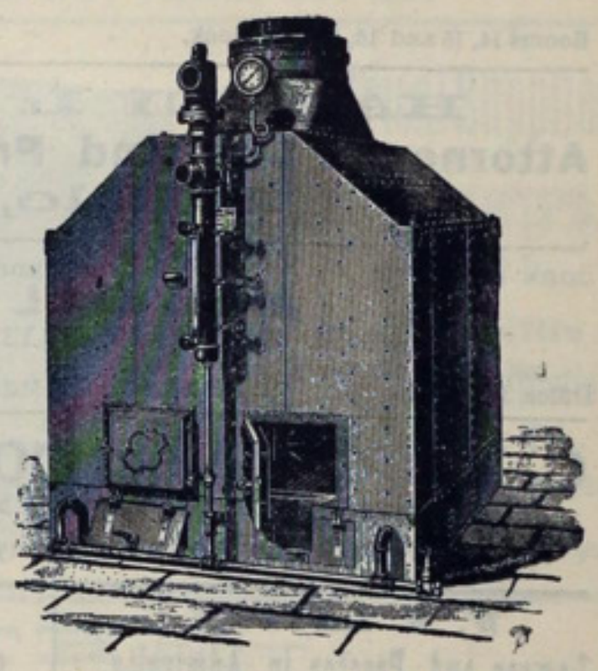

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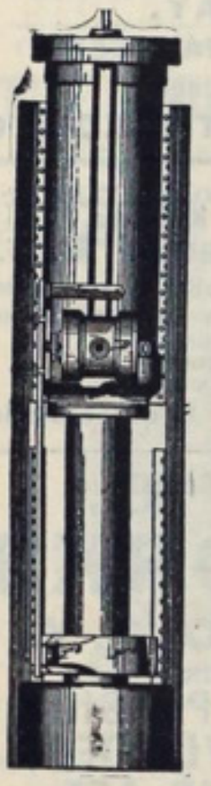

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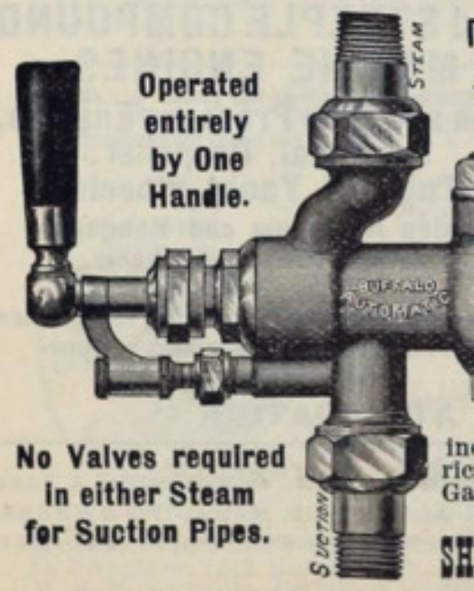

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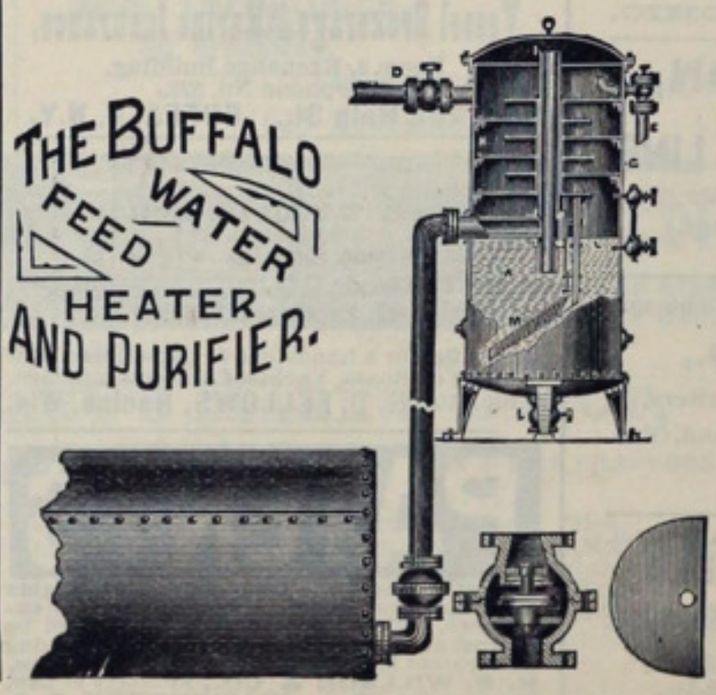

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B.—Boiler.
C.—Feed pipe to boiler.
D.—Steam pipe.
E.—Water supply pipe.
F.—Check valve.
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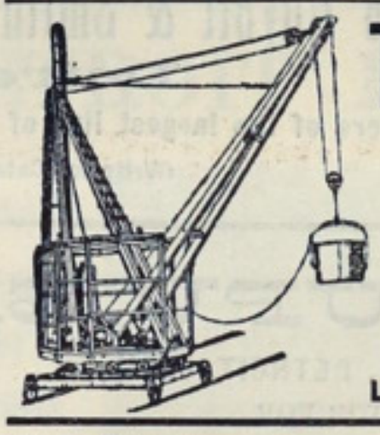

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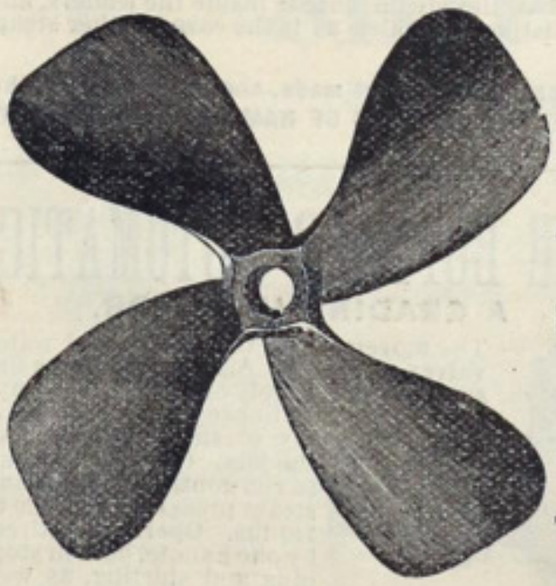

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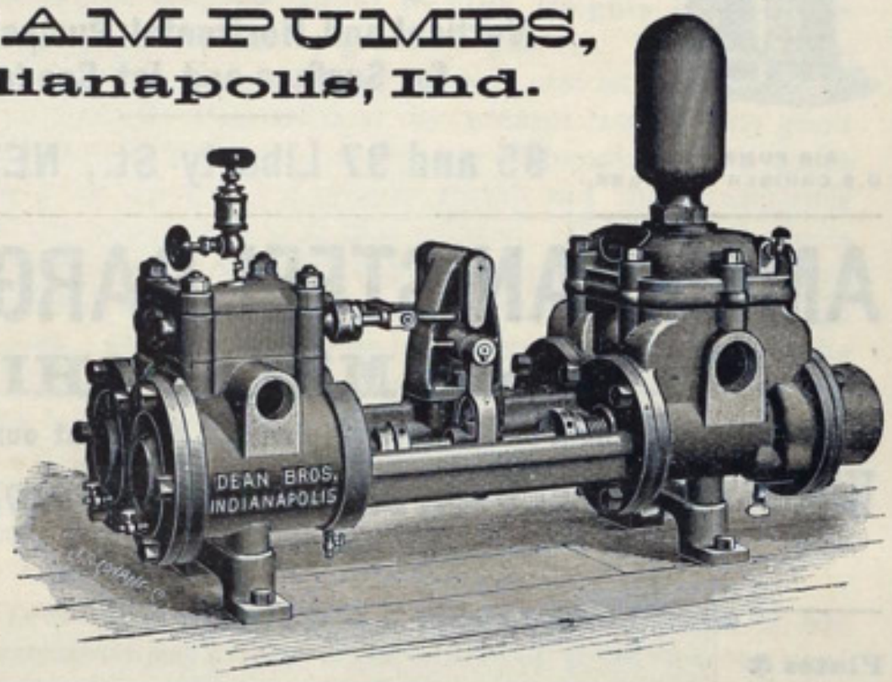

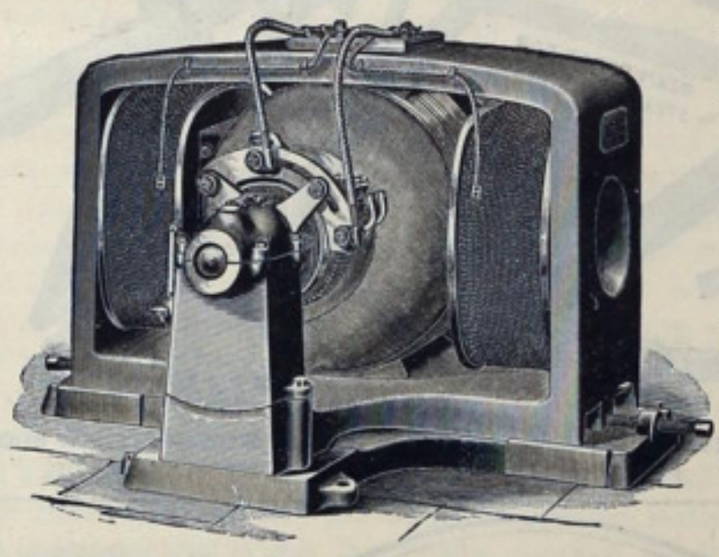

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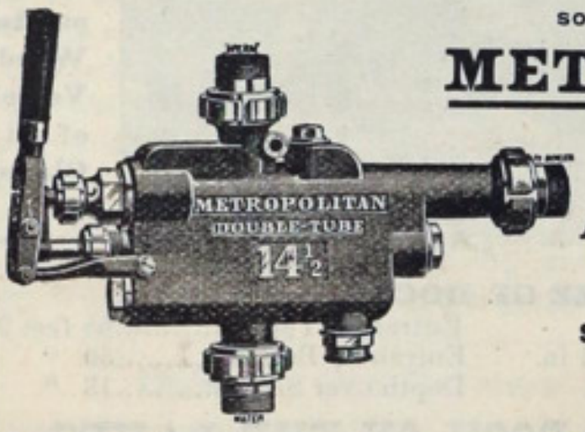

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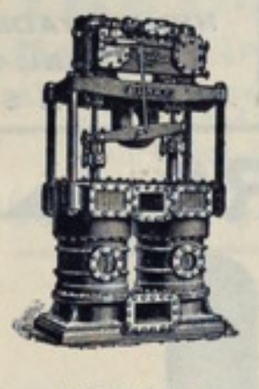

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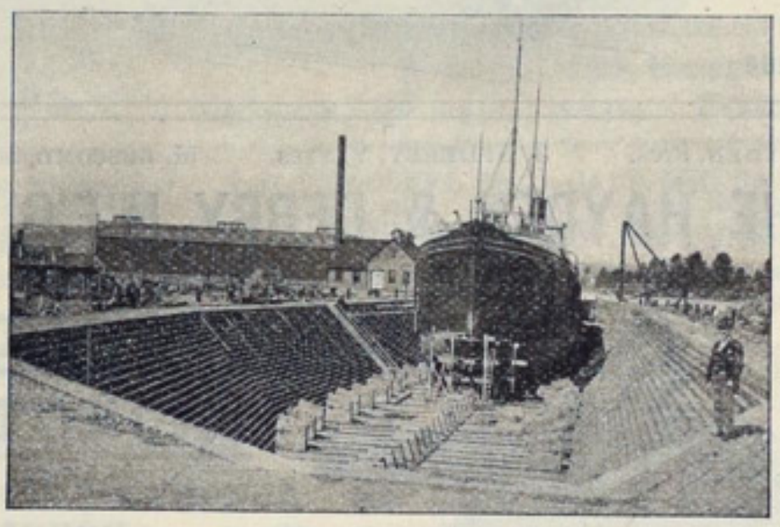

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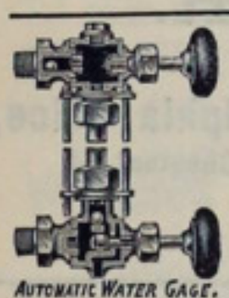

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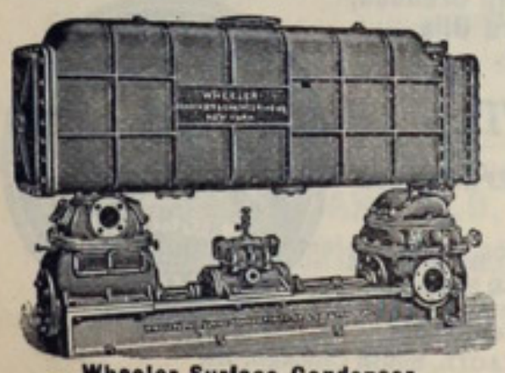

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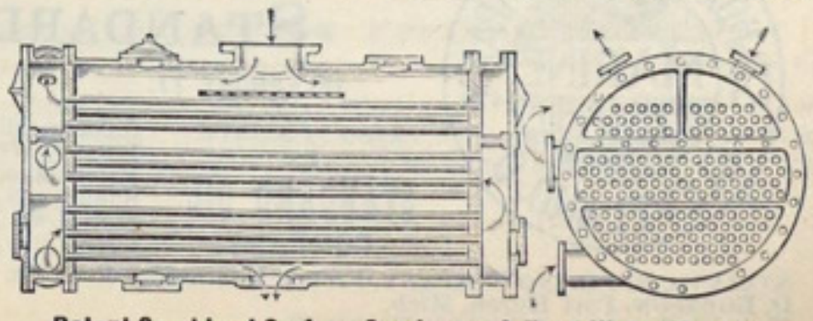

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